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AMSAT NEWS SERVICE
ANS-351

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The AMSAT News Service bulletins are a free, weekly news and information service of AMSAT, the Radio Amateur Satellite Corporation. ANS publishes news related to Amateur Radio in Space including reports on the activities of a worldwide group of Amateur Radio operators who share an active interest in designing, building, launching and communicating through analog and digital Amateur Radio satellites.

The news feed on https://www.amsat.org publishes news of Amateur Radio in Space as soon as our volunteers can post it.

Please send any amateur satellite news or reports to: ans-editor [at] amsat.org

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ANS-351 AMSAT News Service Weekly Bulletins

To: All RADIO AMATEURS
From: Radio Amateur Satellite Corporation
712 H Street NE, Suite 1653
Washington, DC 20002

DATE 2023 Dec 17

ARISS Marks 40th Anniversary of STS-9 with Special Slow Scan Television Event

In a collaborative effort spanning ARISS teams worldwide, a special Slow Scan Television (SSTV) event is currently underway to mark the 40th Anniversary of NASA Space Shuttle mission STS-9. SSTV transmissions from the International Space Station (ISS) are being broadcast on 145.800 MHz using the PD120 format. The scheduled times for the event are from December 16 at 10:15 UTC | 5:15 AM ET through December 19 around 1800 UTC | 1:00 PM ET.

On November 28, 1983, the Space Shuttle Columbia carried Owen Garriott, W5LFL (SK), into orbit. He was equipped with a specially customized Motorola MX-340 two-meter handheld radio and an antenna attached to the shuttle's window. The first amateur radio contact from space took place shortly before crossing the west coast on December 1, 1983, when Columbia executed a roll maneuver exposing the antenna toward Earth. W5LFL began calling CQ, and at 02:38 UTC, Lance Collister, WA1JXN, in Frenchtown, MT, answered the call, marking the first amateur radio QSO with a human in space.

A flurry of QSOs followed over the next several days before Columbia returned to Earth on December 8th. Notable amateur operators in the log included Senator Barry Goldwater, K7UGA, and King Hussein of Jordan, JY1. Slow Scan Television has also been an integral part of Amateur Radio in Human Spaceflight

since its early days, with Tony England, WØORE, paving the way by sending ten images via Slow Scan Television on Space Shuttle Challenger mission STS-51F in the summer of 1985.

Answers to your Frequently Asked Questions (FAQ) about this ISS Slow Scan Television Event, such as how to decode SSTV images and track the ISS, can be found at https://www.spaceflightsoftware.com/ARISS_SSTV/faq.php. You can apply for the ARISS SSTV Award by uploading your decoded image and completing the Application Form using the information provided at https://ariss.pzk.org.pl/sstv. Don't forget that you can receive a QSL Card from the International Space Station by receiving and decoding a SSTV image. More information about how to obtain a QSL Card can be found at https://www.ariss.org/qsl-cards.html.

ARISS (Amateur Radio on the International Space Station) hopes that you can participate in another exciting International Space Station SSTV event. This is a great opportunity to share the magic of amateur radio with your friends and family. Watch for event updates to be posted on X (formerly Twitter) at https://twitter.com/ARISS_Intl. Remember to have fun and best of luck with your SSTV image decoding attempts!

[ANS thanks ARISS for the above information]

HADES-D Satellite: Successful Telecommand Response and FM Repeater Tests Ongoing

The HADES-D satellite, launched aboard SpaceX's Transporter-9 (TR-9) mission on November 11, 2023, has successfully completed a month in orbit. AMSAT-EA reports that, following its separation from the ION SCV-013 Orbital Transfer Vehicle two weeks ago, HADES-D is responding well to telecommands from the ground control station.

Current tests on the FM voice repeater show promising results, demonstrating its effectiveness. However, adjustments to the squelch level are under consideration due to the current configuration requiring increased power for activation. HADES-D's health status has been confirmed through telemetry, CW, and FM voice beacon receptions from various Earth locations.

Telemetry signals in FSK, CW, and FM voice beacon, operating at 436.666 MHz downlink, transmit to Earth at 0.25 Watts. Demodulation and decoding software for satellite telemetry are available on AMSAT-EA's website under the Project tab (https://www.amsat-ea.org/proyectos). The FM repeater, with a 40mW power output, may require a robust antenna for optimal receive performance.

Developed alongside the URESAT Antonio de Nebrija, both utilizing the pocketQubes 1.5P platform, HADES-D features advanced solar panels and increased processing capacity. These advancements enable the satellite to transmit telemetry and repeat signals at higher speeds. The incorporation of an FM transponder for voice communications also allows for message retransmission in FSK. Efforts are ongoing to confirm the final Two-Line Elements for streamlined operations.

[ANS thanks AMSAT-EA for the above information]

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IARU's work that began four years ago with a preparatory study in the ITU Radiocommunication Sector (ITU-R) to address this agenda item has finally come to a close. Our concerted engagement in the ITU-R working parties, study groups, and WRC preparatory meetings ensured that the amateur services were properly represented during the development of two published ITU-R reports: M.2513 and M.2532. An ITU-R Recommendation, M.2164, followed these, which formed the basis for the discussions at WRC-23.

During the WRC-23 deliberations, strong positions were expressed by all parties involved.

The result is a well-supported compromise for a footnote in the Radio Regulations regarding amateur and amateur satellite service operation in the 1240 -1300 MHz range. The footnote reminds administrations and amateurs of the need to protect the primary RNSS from interference, and it provides guidance for administrations to allow both services to continue to operate in this portion of the spectrum.

Administrations are the bodies that govern amateur radio in their respective countries, such as the Federal Communications Commission (FCC) in the United States.

The Conference Plenary compromise was formally adopted on December 8 and is not subject to further consideration during the final week of WRC-23. The IARU team continues its work on other WRC issues, including developing agendas for future conferences.

IARU President Tim Ellam, VE6SH, noted, "This is a very good result for the amateur services. The decision reached at WRC-23 on this agenda item makes no change to the table of allocations nor incorporates by reference M.2164 into the Radio Regulations. The addition of a footnote that provides guidance to administrations in the event of interference to the RNSS is a good regulatory outcome for amateurs and the primary users of this band."

The WRC also agreed to suppress Resolution 774, which closes the issue and satisfies the agenda item. Read more in ARRL News at
https://www.arrl.org/news/wrc-23-reaches-acceptable-conclusion-on-23-centimeter-issue

[ANS thanks ARRL for the above information]

How the 18th Space Defense Squadron Averts Catastrophe at 17,000 Miles Per Hour

In the vast expanse of space, where countless manmade objects hurtle through Low Earth Orbit at speeds exceeding 17,000 miles per hour, a dedicated group of guardians stands watch to prevent potential collisions that could disrupt crucial communication, navigation, and scientific satellites. The 18th Space Defense Squadron (SDS), part of the Space Force, operates from its headquarters at Vandenberg Space Force Base, California, employing advanced technology and surveillance systems to track and identify potential collision risks in real-time.

The 18th SDS, often referred to as the "lighthouse of space," utilizes the U.S. Space Surveillance Network (SSN) to monitor over 45,000 objects in Earth's orbit. Ground-based sensors, including the Ground-Based Electro-Optical Deep Space Surveillance System, capture rapid digital photos of the night sky, revealing satellites as tiny streaks. Computers analyze these streaks to calculate the satellites' positions, providing vital data for collision risk assessments, as explained in a recent press release from the Space Operations Command.

Key components of the SSN include ground-based radar systems such as the AN/FPS-85 and AN/FYS-3 Phased Array Radars, capable of tracking hundreds of targets simultaneously. The 'Space Fence,' located in the Marshall Islands, employs an array system that broadcasts constant bands of energy, tracking objects passing through its coverage. On-orbit platforms like the Space-Based Space Surveillance satellite ensure year-round tracking above earthly obstructions like weather and daylight.

Maintaining an ever-growing catalog of space objects on Space-Track.org, the 18th SDS collaborates with its counterpart, the 19th SDS, to predict satellite trajectories and avert potential collisions. In the crowded expanse of low Earth orbit, the squadron remains vigilant, recognizing the heightened risk posed by unexpected satellite fragments that could lead to disastrous collisions.

Space Operations Command (SpOC) recently outlined four categories of fragmentation events: anomalous debris-causing events, breakup events, collisions, and mission-related events. Anomalous events occur

due to factors like corrosion or fatigue, leading to slow-speed fragment dispersal. Breakup events, generating large amounts of rapidly spreading debris, can be unintentional or intentional, as seen in anti-satellite missile tests. Collisions, exemplified by the 2009 incident involving a Russian military satellite and a commercial Iridium satellite, prompt heightened awareness and response. Mission-related events involve the fragmentation of payloads or unintentional separation of non-payload components.

Members of the 18th SDS remain vigilant for changes in orbital parameters, indicators of potential satellite stress or gas release, which could precede fragmentation events. Specialized software assists in tracking satellite trajectories and determining the origin and trajectory of debris in case of fragmentation. Timely warnings to affected satellite operators enable them to make necessary adjustments, minimizing collision risks.

Despite the 18th SDS's capabilities, over a million objects under 10 cm remain untrackable but pose significant collision threats. The act of maneuvering to avoid collisions consumes satellite fuel and shortens their lifespan. Recognizing the limitations, a recent call by the research group RAND advocates for an international space traffic management system (STM) to enhance coordination and communication among satellite operators.

The current state of managing space objects is described by RAND researchers as "informal, ad hoc, and often ill-coordinated," approaching a tipping point. Urging proactive governance structures, the researchers emphasize the need for the space community to build systems ensuring the safety and sustainability of critical space assets, services, and activities before a crisis necessitates action.

[ANS thanks David Roza, Senior Editor, Air & Space Forces Magazine for the above information]

CubeSat Technology and 3D Printing Combine for Emergency Broadband in Disaster Zones

Researchers from the Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), the University of Luxembourg, and the Universitat Oberta de Catalunya (UOC) have developed a nanosatellite technology aimed at delivering swift emergency broadband connectivity to disaster-stricken regions. This innovative solution combines CubeSat technology with 3D printing, allowing for rapid deployment to enhance communication for emergency services in complex situations.

Professor Carlos Monzo Sánchez of the Universitat Oberta de Catalunya emphasizes the project's significance, stating, "Our project provides a solution that means a communications network to provide help in emergency situations can be established quickly." The core technology is the CubeSat standard for nanosatellites, known for their cost-effectiveness and small size, manufactured on a 3D printer in just 90 minutes.

The CubeSats are then elevated above disaster zones using balloons, utilizing LoRa (low-power long-range radio) communication with the ground. Raúl Parada, a researcher at CTTC and the paper's first author, explains, "Our solution enables communication over long distances and provides a scalable system for a large number of users that is reusable anywhere and at any time."

The team's prototypes leverage the Semtech SX1278 LoRa transceiver, connected to a simple metal ruler antenna. The 1U CubeSat, housing the transceiver, is equipped with a sensor package comprising a Bosch Sensortec BME280 environmental sensor, a TDK InvenSense MPU-9250 inertial measurement unit (IMU), a Hanwei MQ-135 air quality sensor, and a Roithner LaserTechnik GUVA-S12SD ultraviolet light sensor. These sensors are linked to an Arduino Nano microcontroller, with a GPS receiver added later to facilitate satellite recovery.

Emphasizing the practicality of their design, Monzo explains, "Our solution is designed to provide a rapid service in complex scenarios, and as such, we have prioritized its ease of deployment over its use as a telecommunications solution in normal situations." The researchers aim to refine the infrastructure further, focusing on minimizing deployment times and ensuring adaptability to a wide range of situations.

The team's work has been published in the journal Aerospace under open-access terms, marking a significant stride in leveraging technology to enhance emergency response capabilities in disaster-stricken areas.

[ANS thanks Gareth Halfacree, Technical Author, writing for hackster.io, for the above information]

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ARISS NEWS

Amateurs and others around the world may listen in on contacts between amateurs operating in schools and allowing students to interact with astronauts and cosmonauts aboard the International Space Station. The downlink frequency on which to listen is 145.800 MHz worldwide.

+ Recently Completed

Harbor Creek School, Harborcreek, PA, direct via KC3SGV
The ISS callsign was NA1SS
The scheduled crewmember was Andreas Mogensen KG5GCZ
The ARISS mentor is KD8COJ
Contact was successful: Mon 2023-12-11 13:45:04 UTC
Congratulations to the Harbor Creek School students, Andreas, and mentor KD8COJ!

Primary School of Zipari Kos, Zipari, Greece, direct via SV5BYR
The ISS callsign was OR4ISS
The scheduled crewmember was Andreas Mogensen KG5GCZ
The ARISS mentor is IKØWGF
Contact was successful: Thu 2023-12-14 13:17:31 UTC
Watch the Livestream at https://www.youtube.com/watch?v=tzRrMguN-VI

+ Upcoming Contacts

No upcoming school contacts are scheduled.

The crossband repeater continues to be active (145.990 MHz up {PL 67} & 437.800 MHz down). If any crewmember is so inclined, all they have to do is pick up the microphone, raise the volume up, and talk on the crossband repeater. So give a listen, you just never know.

The packet system is listed as temporarily stowed. Look for SSTV transmissions on 145.800 MHz between December 16th through December 19th.

As always, if there is an EVA, a docking, or an undocking; the ARISS radios are turned off as part of the safety protocol.

Note, all times are approximate. It is recommended that you do your own orbital prediction or start listening about 10 minutes before the listed time.

The latest information on the operation mode can be found at
https://www.ariss.org/current-status-of-iss-stations.html

The latest list of frequencies in use can be found at https://www.ariss.org/contact-the-iss.html

[ANS thanks Charlie Sufana, AJ9N, one of the ARISS operation team mentors for the above information]

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http://hams.at and watch Jonathan's Twitter feed for any updates (https://twitter.com/N4AKV_).

A growing number of satellite rovers are currently engaged in sharing their grid square activations on https://hams.at. By visiting the website, you gain easy access to comprehensive information about the operators responsible for activating specific grid squares. Additionally, you have the ability to assess the match score between yourself and a particular rover for a given pass, while also being able to identify the upcoming satellite passes that are accessible from your location.

[ANS thanks Ian Parsons, K5ZM, AMSAT rover page manager, for the above information]

Hamfests, Conventions, Maker Faires, and Other Events

AMSAT Ambassadors provide presentations, demonstrate communicating through amateur satellites, and host information tables at club meetings, hamfests, conventions, maker faires, and other events.

+ 40th Anniversary Celebration of the Positive Impact of Amateur Radio on Human Spaceflight
Thursday February 22nd through Saturday February 24th, 2024
Center for Space Education: Astronauts Memorial Foundation
Kennedy Space Center, M6-306 405 State Road, FL 32899
https://www.ariss.org/overview.html

[ANS thanks the AMSAT Events page for the above information]

Satellite Shorts From All Over

+ AO-73 (FUNcube-1), managed by AMSAT-UK and AMSAT-NL, has reactivated its transponder after a meticulous year of battery management. Launched a decade ago, the satellite faced challenges with its battery struggling to reach the nominal 8.3V charge. Recent efforts, including strategic transmitter shutdowns during eclipse periods, have improved the situation. The battery voltage now varies between 8.13V in sunlight and 7.8V at the end of an eclipse, a significant improvement. AO-73 is currently transmitting low-power BPSK telemetry on 145.935MHz, featuring an inverting mode U/V transponder uplink ranging from 435.130 to 435.150 MHz, with a downlink set at 145.970 to 145.950 MHz. The satellite maintains a high spin rate of approximately 30 rpm, requiring manual tuning for the 70 cm input due to the receiver's temperature drift. This development reopens exciting opportunities for radio operators interested in exploring AO-73's capabilities after its temporary hiatus. (ANS thanks David Bowan, G0MRF, AMSAT-UK for the above information)

+ NASA's Voyager 1 probe, now in interstellar space, is experiencing a communication glitch, preventing the transmission of scientific or systems data. The 46-year-old spacecraft can receive commands, but its flight data system (FDS) is no longer communicating as expected with the telecommunications unit (TMU). The FDS compiles data into a package for transmission, but it's currently stuck in a repeating pattern of ones and zeros. Voyager's engineering team is investigating, but a solution may take weeks. The spacecraft's age and technology from the 1970s present unique challenges, and previous malfunctions required creative software workarounds. Despite past issues, finding solutions for Voyager's challenges is a slow process, involving consultation of decades-old documents. (ANS thanks Josh Dinner, Content Manager & Writer, Space.com, for the above information)

+ Blue Origin is set to resume New Shepard suborbital launches no earlier than December 18th, marking the vehicle's first potential flight in over 15 months. The uncrewed mission, NS-24, will follow a mishap in September 2022 when a structural failure in the BE-3PM engine led to a capsule landing safely while the propulsion module crashed. The Federal Aviation Administration closed its investigation in September 2023, outlining 21 corrective actions for Blue Origin, including technical modifications and organizational changes. The delay in resuming flights prompted speculation about the company's priorities, but it has since won a NASA contract for a lunar lander, introduced an orbital transfer vehicle, and progressed with the New Glenn orbital launch vehicle and Orbital Reef space station projects. During this hiatus, Virgin Galactic began commercial service with its SpaceShipTwo, VSS Unity, but announced plans to shift to quarterly flights in 2024 and eventually halt operations to focus on new suborbital vehicles. (ANS thanks Jeff Foust, writing for SpaceNews, for the above information)

+ NASA astronaut Frank Rubio grew tomatoes in space using hydroponic techniques to demonstrate space agricultural methods on the International Space Station (ISS). After harvesting one of the first tomatoes grown in space, Rubio misplaced it during a public event with school kids, sparking a humorous search on the ISS. In the microgravity environment, anything unanchored can float away, and despite spending hours searching, Rubio never found the tomato. The mystery ended when the remaining ISS crew announced they had located the tomato, clearing Rubio of suspicions that he had eaten it. Rubio's historic mission on the ISS, lasting over a year, set a record for the longest a US astronaut has spent in microgravity, initially planned for six months. (ANS thanks Jackie Wattles, Space & Science Writer, CNN, for the above information)

Join AMSAT today at https://launch.amsat.org/

In addition to regular membership, AMSAT offers membership to:

* Societies (a recognized group, clubs or organization).
* Primary and secondary school students are eligible for membership at one-half the standard yearly rate.
* Post-secondary school students enrolled in at least half time status shall be eligible for the student rate for a maximum of 6 post-secondary years in this status.
* Memberships are available for annual and lifetime terms.

Contact info [at] amsat.org for additional membership information.

73 and remember to help Keep Amateur Radio in Space!

This week's ANS Editor, Mitch Ahrenstorff, ADØHJ
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